

# Modelling the Demand for Bank Loans by Private Business Sector in Pakistan

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# Modelling the Demand for Bank Loans by Private Business Sector in Pakistan[1]

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**ABSTRACT**

The importance of studying demand for bank loan by private business sector stems from the fact the money supply is 'credit-driven' and demand-determined and at the rate of interest determined by the central bank the money supply function is horizontal as illustrated by Moore and Threadgold (1985), Coghlan, (1981), Moore (1979, 1983). The analysis of the demand for bank loan by private business sector is important for understating the monetary transmission mechanism and formulation of the effective monetary policy to achieve macroeconomic objectives. The study aimed to model the demand for bank loan by private business sector in Pakistan.

We use Hylleberg, et al., (1990) seasonal unit root test for investigation of properties of data. The dynamic Autoregressive Distributed Lag (ARDL) model is used for long rung and the short run analysis of demand for bank loans by the business sector. For the testing long run relationship among the variables we used bounds test proposed by Pasaran and Shin (1995). Real rate of return on advances, economic activity, expectations about future state of economy, macroeconomic risk, inflation and foreign demand pressure are taken as the determinants of demand for bank loan by private business sector. Economic activity, real rate of interest, macroeconomic risk and inflation were found significant in affecting demand for bank loans while the estimated equation do not provide evidence for the role of foreign demand pressure and expectations about future state of economy in effecting demand for bank loans. The sign of the coefficients of real rate of return on advances, inflation and macroeconomic risk is negative whereas economic activity is directly related to demand for bank loans by private business sector. The short run model shows that the speed of adjustment is 8.5% quarterly. Therefore it takes three years to go back to the long run equilibrium level. In the short run change in rate of inflation, RRA and economic activity have negative impact. The short run equation explores that change in real rate of return (RRA) does not affect RDBL. It implies that in very short run business cannot change their demand for bank credit in response to changes in real interest rate. Changing in macroeconomic risk appears in the model in form against a priori expectations. Foreign demand pressure (FDP) has no long run effect and in short run has the coefficient having low value. The demand for bank loan by private business sector was found interest elastic and gives the provision to central bank to control credit in the economy through variations of interest rate.

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# 1. INTRODUCTION

The impact of bank credit on macro-economic fluctuations has always been a topic of interest in monetary economics (Meltzer and Brunner, 1963, Bernanke and Blinder, 1988) because it helps to understand the monetary transmission mechanism and suggest appropriate monetary policy. The desired objectives of monetary policy which are sustainable economic growth, and price stability cannot be achieved without knowing credit channel of monetary transmission which requires the knowhow of credit demand. Ross Levine (1997) concluded that sufficient understanding of long-run economic growth is not possible without understanding the evolution and functioning of financial systems. Friedman (1984) indicates that "neither money nor credit is sufficient to account fully for the effect of financial markets in determining real economic activity" and for macroeconomic analysis he recommended the use of credit market in addition to income and money market.

Monetary policy through the channels of financial markets and bank-based intermediation influences the expectations about the future direction of economic activity and inflation. Financial intermediaries perform five basic functions that are mobilizing savings from domestic households and corporate, pooling and managing risk, acquiring and publicizing information about investment opportunities, monitoring borrowers and facilitating the exchange of goods and services, which affect the real economy. Therefore it requires a stable financial system, which has the power to facilitate the smooth and efficient financial intermediation for proper transmission of monetary policy. And only then proper monetary policy will guarantee sustainable economic growth and price stability

The importance of analyzing demand for credit stems from the view that money supply is 'credit driven' and demand determined. Coghlan (1981) and Moore (1979, 1983) illustrated that the quantity of bank borrowing is largely demand determined, and they give

additional support for the view of a credit driven money stock. Similarly, Moore and Threadgold (1985) argued that the money supply is 'credit-driven' and demand-determined and at the rate of interest determined by the central bank the money supply function is horizontal. "Both the base and the money stock are in fact endogenous. The evidence suggests that the quantity of bank intermediation is determined primarily by the demand for bank credit" (Moore, 1983). "In the real world banks extend credit, creating deposits in the process, and look for the reserves later" (Holmes, 1969, p. 73).

Understanding the sensitivity of private- sector credit demand helps the central bank to decide about the magnitude of interest rate change in order to achieve the desired monetary objective. If private sector credit demand is relatively insensitive then the central bank has to set comparatively higher change in interest rate to effect the spending level in the economy.

Hence the demand for bank lending by private sector contains lots of useful information that helps to understand monetary transmission mechanism and to formulate the effective monetary policy and thereby in achieving macroeconomic objectives. The work done on demand for bank loans by private business sector can be divided in four basic categories. First category includes studies which have estimated the demand for credit as an equation associated with a system. These studies employ two reduced form equations one of credit demand and other of credit supply to estimate the system. Work by Melitz and Pardue (1973) is the example of this category. Hicks (1979) and Panagopoulos and Spiliotis (1998) analyzed demand for bank loans under equilibrium condition; they defined demand and supply equations separately but solved them as single reduced form equation by implying the equilibrium condition. Works of Laffont and René (1977), Blundell et. al., (1992) and Ghosh and Ghosh (1999) formed the third category, they analyzed the demand for bank loans in disequilibrium situation by defining demand and supply equations separately and followed

Maddala and Nelson (1974) for deriving likelihood function, these studies assume that observed quantity of loans are minimum of demand for loans and supply of loans. Forth category is of those studies which have estimated the demand for bank credit in isolation from supply side of market, these studies assume that at a specific interest rate, settled by banks, credit to private sector is determined by demand in the market. Our study has also used the same approach for analysis of demand for bank loan by private business sector. The studies which have used this approach are Moore (1983), Cuthbertson (1985), Moore and Threadgold (1985), Arestis (1987-88), Arestis et. al., (1995), Calza, et. al., (2001), Qayyum (2002), Leonardo (2002), Pandit and Vashisht (2011), among others.

In Pakistan there is a single study over the topic by Qayyum (2002). He has taken industrial output, rate of inflation and real rate of return as explanatory variables in the econometric model. The current study endeavours to investigate the demand for bank loan by private business sector by taking real rate of return, rate of inflation, economic activity, expectations about future state of economy, foreign demand pressure and macroeconomic risk as its determinants by using quarterly data from 1973 Q3 to 2010 Q2.

The second section specified model of demand for bank loans by the business sector. Section 3 deals with econometric methodology used for the analysis and the section 4 present estimation of the model. Final section discussed conclusions and policy implementations.

## 2. MODEL SPECIFICATION

The main sources of funds for companies are sales revenue, bank advances, the issue of commercial bills, loan stock or equity and running down liquid assets. In broad terms, firms use these funds to cover running costs (e.g. wages, materials and tax payments), for stock-building and for fixed investment (Cuthbertson, 1985).

Whenever firms decide to borrow money from external sources they have to choose among different alternatives. In Pakistan bank borrowing is the most popular source of financing by private corporations as compared to other sources like equity financing and term certificates. The demand for bank lending by private business sector depends on number of variables.

While listing the determinants of demand for bank lending by private business sector, interest rate charged by commercial banks for these loans is a variable included in every study. For example Hicks (1979), Moore (1983), Cuthbertson (1985), Arestis (1987-88), Panagopoulos and Spiliotis (1998), Ghosh and Ghosh (1999), Calza, et. at., (2001), Qayyum (2002), Pandit and Vashisht (2011) used interest rate as a determinant of demand for bank loan.

Another important factor influencing credit demand by private business sector is economic activity. Many studies of credit demand e.g., Calza, et. at., (2001), Arestis (1987-88), taken GDP as an economic activity variable but as the purpose of this study is to analyze the business sector demand so following the studies of Laffont and René (1977), Ghosh and Ghosh (1999), Qayyum (2002), industrial output is included as explanatory variable instead of GDP. In literature there are two distinct views about relationship of economic activity and demand for credit. Some studies suggest positive relationship between economic activity and credit demand and argue that robust economic growth increases the expectations of firms for higher profits and future incomes and therefore firms increases their demand for credit to expand and initiate new projects to reap up the future benefits (Kashyap, et. at., 1993). By contrast Friedman and Kuttner (1993) and Bernanke and Gertler (1995) illustrated the existence of negative relationship between economic activity and demand for credit. They observed that in periods of higher economic activity, due to increase in current production

and because of higher profits firms are in position to finance their businesses through internal sources and thus demand for credit will shrink during economic expansion.

Inflation is also incorporated in the model as explanatory variable. Inflation effects demand for bank loans by private business sector in two ways. If firms expect that increase in rate of inflation will be higher than increase in nominal rate of interest then their demand for loans will be higher because increase in inflation compensates the effect of increase in interest rate. On the other hand increase in inflation is associated with the riskiness of projects, it will affect both costs and revenues, and high rate of inflation will cause firms to invest lesser than before. So in this way, inflation and demand for bank loans by private sector shows negative association. Cuthbertson (1985) used inflation in his analysis and found negative relationship between inflation and demand for bank lending. In Pakistan context work of Qayyum (2002) also found inverse relationship of demand for bank loans and inflation.

Macroeconomic risk is also considered in the model. The macroeconomic circumstance within country in particular and globally in general affects the investment decisions. If level of uncertainty is high due to unfavourable economic conditions then investors will be cautious to invest. So, negative relationship can be expected between macroeconomic risk and demand for bank loans by private business sector. For measuring macroeconomic risk variance of moving average of inflation is used.

Expectation about future state of economy is also included in the model. Moving average of stock price indices is used for this purpose. Stock price indices give signals about expectations of most informed group (stock market participants) about future situation of the economy. Ghosh and Ghosh (1999) has also used the price of stock market as a proxy for future expected output in demand for real credit equation. Similarly Pandit and Vashisht

(2011) has also used the moving average of stock price index in analyzing demand for bank loan. In order to capture the foreign demand pressure, index for volume of export is included in the model.

Following model of demand for bank loan by the private business sector is;

$$\mathbf{RDBL_t = f\ (RRA_t, EA_t, FDP_t, INF_t, MER_t, EFSE_t)} \qquad \mathbf{(1)}$$

Where

$RDBL_t$ = Log of real bank loans by the private business sector
$EA_t$ = Log of industrial output index as an economic activity
$FDP_t$ = Log of volume of export index as a foreign demand pressure
$MER_t$ = Variance of moving average of rate of inflation as Macroeconomic risk
$EFSE_t$ = Moving average of log of share price index as expectations about future state of the economy
$RRA_t$ = Real rate of return on advances.
$INF_t$ = the rate of inflation

The ARDL approach proposed by Pesaran and Shin (1999) is found appropriate for analysis. The following ARDL model is specified:

$$\Delta RDBL_t = \alpha + \sum_{i=1}^{k} \beta_{1i}\, \Delta RDBL_{t-i} + \sum_{i=0}^{k} \beta_{2i}\, \Delta EA_{t-i} + \sum_{i=0}^{k} \beta_{3i}\, \Delta RRA_{t-i} + \sum_{i=0}^{k} \beta_{4i}\, \Delta FDP_{t-i} + \sum_{i=0}^{k} \beta_{5i}\, \Delta INF_{t-i} + \sum_{i=0}^{k} \beta_{6i}\, \Delta EFSE_{t-i} + \sum_{i=0}^{k} \beta_{7i}\, \Delta MER_{t-i} + \lambda_1 RDBL_{t-1} + \lambda_2 EA_{t-1} + \lambda_3 RRA_{t-1} + \lambda_4 FDP_{t-1} + \lambda_5 INF_{t-1} + \lambda_6 MER_{t-1} + \lambda_7 EFSE_{t-1} + \mu_t \qquad \mathbf{(2)}$$

Where $\Delta$ represents first difference, $k$ is the maximum number of lags included in the model and $\mu_t$ is the error term as normally distributed with zero mean and constant variance. The $\lambda_i$ symbolizes parameters of long run relationship.

To find out long run parameter estimates of different variables, lagged values of independent variables in ARDL model are divided by coefficient of lagged dependent variable. In this way we get the normalized vector which shows the long run coefficients.

To show the short run dynamics, Error correction model (ECM) is estimated. The ECM model contains the lagged error term of long run model and all independent variables in differenced form and the dependent variable of the model is the first difference of real demand for bank loans by private business sector. The dynamic ECM model is represented by the following equation.

$$\Delta RDBL_t = \gamma + \sum_{i=1}^{k} \beta_{1i}\, \Delta RDBL_{t-i} + \sum_{i=0}^{k} \beta_{2i}\, \Delta EA_{t-i} + \sum_{i=0}^{k} \beta_{3i}\, \Delta RRA_{t-i} + \sum_{i=0}^{k} \beta_{4i}\, \Delta FDP_{t-i} + \sum_{i=0}^{k} \beta_{5i}\, \Delta INF_{t-i} + \sum_{i=0}^{k} \beta_{6i}\, \Delta EFSE_{t-i} + \sum_{i=0}^{k} \beta_{7i}\, \Delta MER_{t-i} + \delta\, ECM_{(t-1)} + \nu_t \quad (3)$$

The ECM is the residual formed by difference of actual values of RDBL and its estimated values, $\mathbf{v_t}$ is the error term normally distributed with zero mean and constant variance, k is the maximum of lags included in the model and Δ is the first difference operator.

For univariate analysis Hylleberg, Engle, Granger and Yoo (HEGY) test is used instead of DF and ADF because they implicitly assume that unit root only exists at zero frequency and bi-annual and seasonal unit roots are ignored in the analysis. While HEGY test was developed using quarterly data and special consideration was made for testing seasonal, bi-annual and annual unit roots.

Bounds testing approach illustrated by Pesaran et. al., (1999) is used to test the existence of long run relationship. The use of bounds testing approach has the advantage that it does not require the variables to be of same order. As the current study has variables which are integrated of order one as well as some variables in our model are integrated of order zero, so instead of using Engle and Granger (1987) Johansen (1988) and Johansen and Juselius (1990), we have used the bounds testing approach.

Quarterly data spanning from 1971Q1 to 2010Q2 is utilized for estimation. The sources of data are various issues of International Financial Statistics published by

International Monetary Fund and Statistical Bulletin by the State Bank of Pakistan. While some part of demand for bank loan by private business sector is acquired from the Statistical Division of the State Bank of Pakistan.

## 3. ESTIMATED MODEL

### 3.1 Test of Integration

In order to decide about stationarity of variables and decide about their order of integration seasonal unit root test of Hylleberg, et. Al. (1990) is applied. The test results are given in the Table 1. As can be seen from the Table 1, all the variables except the macroeconomic risk that is MER, has unit root at zero frequency. Therefore we transform the variables in the first difference to get stationarity of the data.

**Table 1: HEGY Test for Seasonal Unit Root**

| Variable Name | $\pi_1$ (t- values) | $\pi_2$ (t- values) | $\pi_3 = \pi_4 = 0$ (F- statistics) | Remarks |
|---|---|---|---|---|
| $RDBL_t$ | -0.862478 | -3.419330 | 17.20253 | I(1) |
| $\Delta RDBL_t$ | -4.706122 | -3.437100 | 17.41988 | |
| $EA_t$ | -2.445151 | -3.437902 | 5.991635 | I(1) |
| $\Delta EA_t$ | -4.215862 | -3.686182 | 6.573594 | |
| $FDP_t$ | -1.426813 | -3.330907 | 10.89514 | I(1) |
| $\Delta FDP_t$ | -7.441997 | -3.339405 | 11.03128 | |
| $EFSE_t$ | -0.949061 | -3.449376 | 37.63094 | I(1) |
| $\Delta EFSE_t$ | -4.226618 | 3.487383 | 37.34716 | |
| $RRA_t$ | -2.925179 | -4.166304 | 13.54651 | I(1) |
| $\Delta RRA_t$ | -6.749805 | -4.324245 | 13.56799 | |
| $MER_t$ | -3.543304 | -5.741019 | 35.86812 | I(0) |
| $INF_t$ | -3.925365 | -4.045070 | 12.61850 | I(0) |

### 3.2 Bounds Test for Cointegration

In order to check the validity of long run relationship between real demand for bank loan and other variables bounds test approach proposed by Pesaran and Shin (1999) is carried out. Test results are given below F-value of bounds test is 5.7418 which is greater than upper bound at 5% significance level. It is concluded that there is long run relationship among the variables.

### 3.3 Long Run Credit Demand Model

Long run parameter estimates are derived after estimating the ARDL model using 6 lags and by dropping the insignificant variables using general to specific methodology. The long run parameter estimates are given in the following equation.

$$\begin{array}{lccccc} RDBL = & 4.024 & - 0.0297*RRA & + 1.359*EA & - 0.170*INF & - 0.042*MER \\ & (4.88) & (-1.63) & (3.49) & (-4.41) & (-2.92) \end{array} \qquad (4)$$

The results reveal inverse relationship between real rate of return and real demand for bank loans by private business sector which is as expected. The relationship of economic activity and demand for bank lending by private business sector is found positive. The sign of inflation coefficient is found negative. And suggest that high inflation is also associated with high variation in inflation and therefore during high inflation businesses consider investment riskier than in periods of low inflation. Therefore inflation is negatively associated with real demand for bank loan. The sign of inflation is in accordance with the studies by Cuthbertson (1985) and Qayyum (2002). Macroeconomic risk was found significant variable in long run model and the sign of its coefficient shows inverse relationship with demand for bank credit by private business sector. This information reveals that when macroeconomic risk increases private business sector will demand less credit from banks. It is also important to mention that foreign demand pressure and expectations about future state of the economy (EFSE)

were found insignificant and are eliminated in elimination process while forming a specific model from a general one.

## 3.4 SHORT RUN DYNAMICS

Short Run model illustrates the short run dynamics of demand for bank loans by private business sector as well as provides the coefficient of Error Correction term. Error correction term tells us that how long it will take to be back to the long run equilibrium. The results of short run model are represented in the following table which is derived after including all variables in first difference and their 6 lags. The table only provides information about those variables which are found significant at the 5 % l3v3l and all insignificant variables are deleted by using general to specific methodology.

**Table 2: Short Run Dynamic Model**

| **Dependent Variable: ΔRDBL** | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| ECM(-1) | -0.085443 | 0.013298 | -6.425111 | 0.0000 |
| ΔINF | -0.016326 | 0.002038 | -8.009247 | 0.0000 |
| ΔEA(-1) | -0.061195 | 0.028179 | -2.171674 | 0.0317 |
| ΔRRA(-3) | -0.018210 | 0.006408 | -2.841678 | 0.0052 |
| ΔINF(-3) | -0.018189 | 0.006611 | -2.751144 | 0.0068 |
| ΔMER(-3) | 0.003570 | 0.001233 | 2.895490 | 0.0044 |
| ΔFDP(-5) | -0.044828 | 0.020305 | -2.207736 | 0.0290 |
| ΔMER(-5) | 0.004985 | 0.001462 | 3.409489 | 0.0009 |
| ΔRRA(-6) | 0.005260 | 0.001767 | 2.977390 | 0.0035 |
| ΔFDP(-6) | 0.041371 | 0.020425 | 2.025519 | 0.0448 |
| ΔMER(-6) | 0.003272 | 0.001449 | 2.257062 | 0.0256 |
| ΔEA(-6) | -0.157407 | 0.031539 | -4.990859 | 0.0000 |
| ΔRDBL(-2) | 0.161405 | 0.062734 | 2.572838 | 0.0112 |
| ΔRDBL(-4) | 0.300802 | 0.059612 | 5.045974 | 0.0000 |

| Diagnostic Test | |
|---|---|
| $R^2$ = 0.676006 | Adjusted $R^2$ = 0.644338 |
| Breusch-Godfrey Serial Correlation LM test (lag 1) = 0.0000 | |
| Breusch-Godfrey Serial Correlation LM test (lag 4) = 5.071 | |
| Ramsay RESET Test (lag 1) = 0.000973 | ARCH (1) = 0.7644 |

The diagnostic tests depicts that the estimated model gas no serial correlation at lag 1 as well as lag 4, no specification and no ARCH at the 5 % level. To check the stability of the short run model CUSUM and CUSUM of squares plot is analyzed. The plot of CUSUM shows that the model is stable as cumulative sum of recursive residuals lies within the bounds. The results of CUSUM squares also depicts that the model is roughly stable. The plots of these tests at 5% significance level are given as under:

**Figure: 1 CUSUM Test Results of Short Run Model**

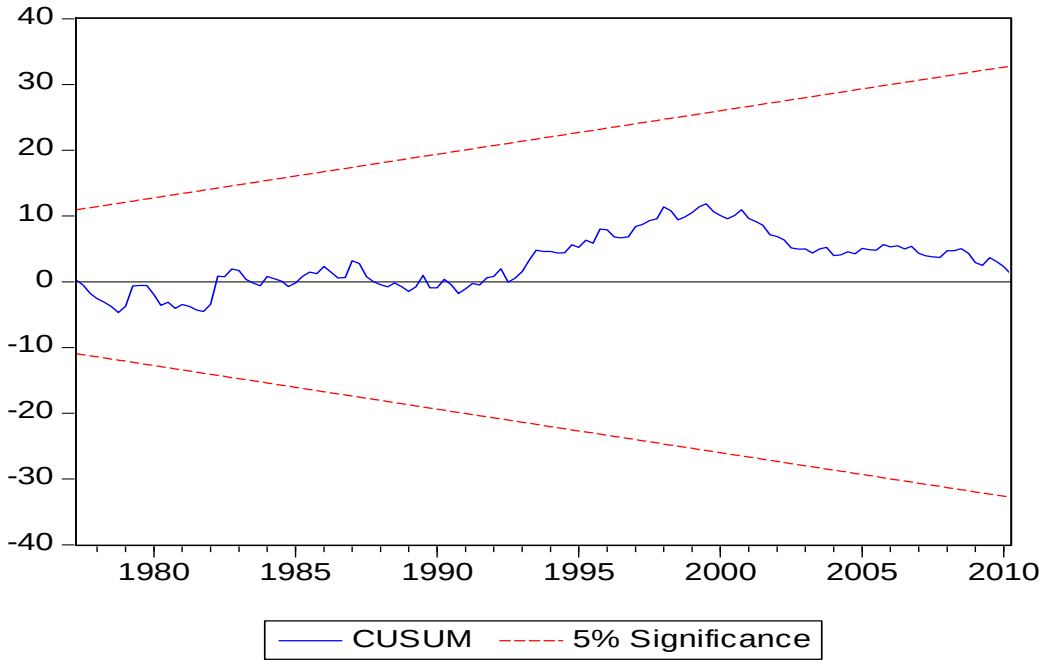
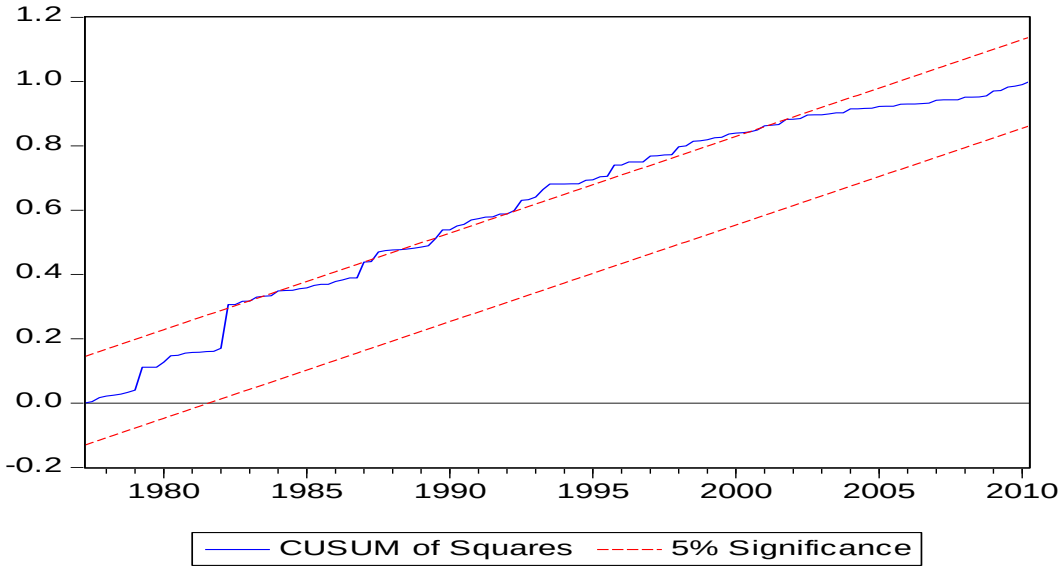


**Figure 2: CUSUM of Squares Test Results of Short Run Model**




The coefficient of Error Correction term in the short run model is -0.085443. The parameter estimate of error correction term describes that in one quarter about 8.5% of error is corrected. The speed of adjustment is low which shows that there are frictions which forbid the demand for bank loans by private business sector to quickly go back to the long run equilibrium level. The reasons for slow speed of adjustment might be the demand for bank loans includes short as well as long term loans. The decision about short term loans can be changed from period to period but changing decisions about long term loans takes time as commitments are made for longer period. The other reason of slow adjustment in Pakistan could be the uncertain policies and political instability in the country because of which the business sector hesitates to go back to the equilibrium level quickly. However to find the concrete reasons for low level of adjustment more through and micro level study of borrowers behaviour is required.

In the short run model inflation appears in first difference and its 3rd lag. Both coefficients have negative signs. So, the estimated equation suggests that if inflation is high in the current period and remained high during 3$^{rd}$ last quarter then demand for loan will be

less in the current quarter. Economic activity appears as 1st and 6th lag of differenced series and its sign is negative. The short run equation explores that Real rate of return (RRA) does not affect RDBL in very short run i.e. the first difference of RRA and its first 2 lags are not significant and hence are excluded from the short run equation. It means that in very short run business cannot change their demand for bank credit in response to changes in its price because it might be difficult to change their plans of borrowing money or changing the source of existing debts and find other alternates very quickly. The 3rd and 6th lag of differenced RRA is significant and has negative sign but its magnitude is low as compared to long run coefficient. Again the reason for low impact of real interest rate on demand for bank loans by private business sector than its long run effect could be that in short run changing debt sources or changing plans of expansion or contraction are difficult and it takes time to change debt sources. Macroeconomic risk appears in the model in form of 3rd, 5th and 6th lag of differenced MER but the signs of all the three are not correct but it can be ignored by taking into consideration the information that the coefficient values are very close to zero i.e. 0.00357, 0.0049 and 0.0032. So in short run the impact of macroeconomic risk on demand for bank for bank credit by private business sector can be ignored. Foreign Demand Pressure (FDP) did not appear in the long run equation and in short run only 5th and 6th difference was found significant but the coefficient values are quite low. So it could be concluded that the foreign demand pressure do not effect considerably the demand for bank loans by private business sector.

## 4 POLICY IMPLICATIONS

The present study attempted to analyze the determinants of demand for bank loans by private business sector in Pakistan and it helps in the following ways in policy formulation. The analysis of impact of macroeconomic risk, inflation through lights on the need of

bringing macroeconomic stability for expanding demand for bank lending and thus for expansion of businesses. The negative signs of macroeconomic risk and rate of inflation shows that businesses are shy to invest when there is instability in the policies and macroeconomic conditions. As in the study the demand for bank loan by private business sector is found elastic to real rate of return on advances/real rate of interest so it can help the monetary authorities to control money demand and hence money supply in the economy.

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